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Environmental Mitigation Plan for Goods Movement in Southern California

Project Status Update

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Jeff Ang-Olson, ICF

Project Objectives

- Identify potential emission reduction strategies for goods movement
- Estimate emission reductions, costs, and cost-effectiveness of each strategy
- Assess potential for SIP credit, feasibility, timeline, barriers to implementation, and acceptability to stakeholders
- Prioritize strategies and quantify what could be accomplished with given investment (e.g., $10 billion)
- Support achievement of NAAQS; provide input to AQMP and SCAG RTP Update

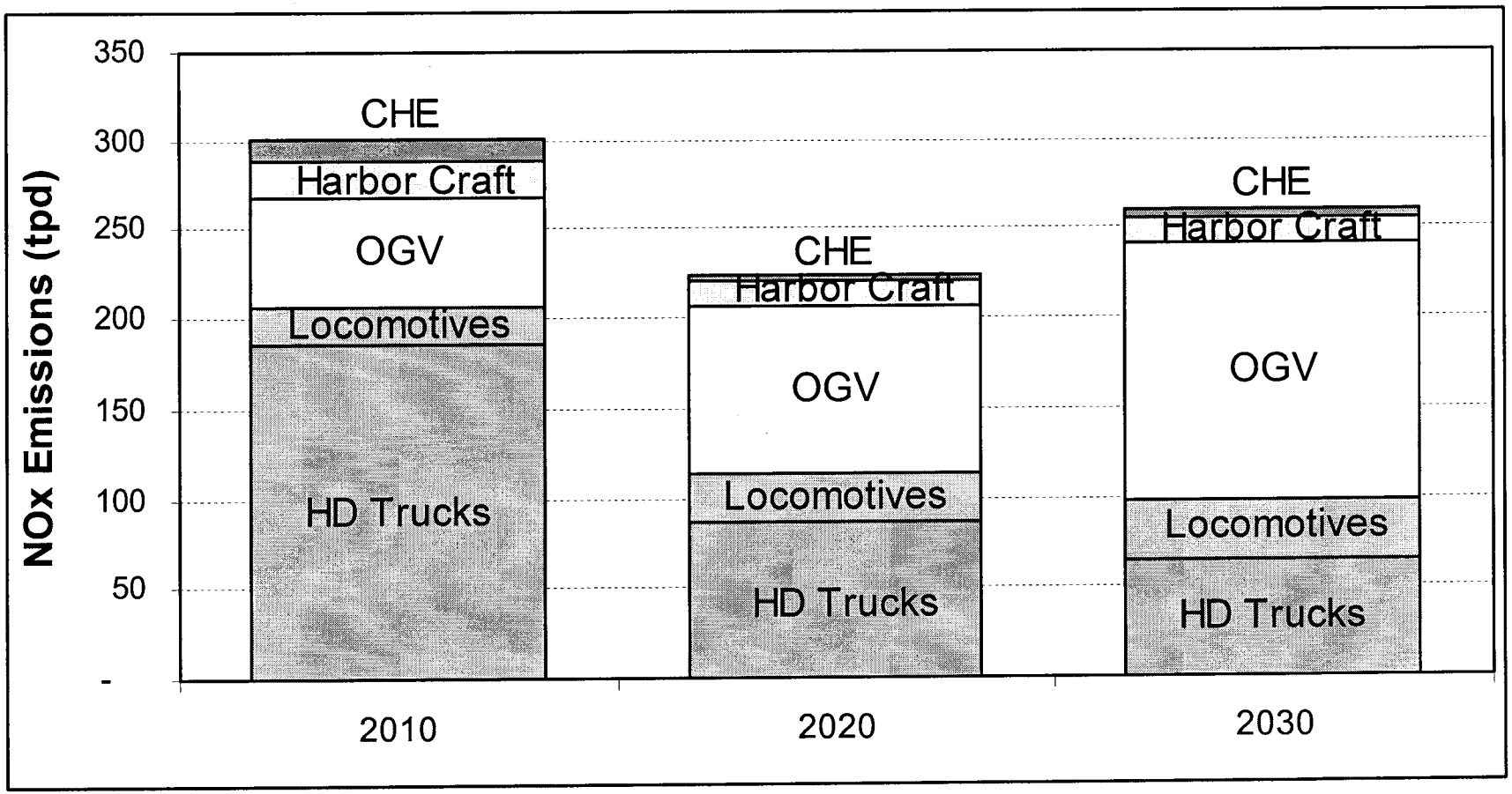
Project Tasks

- Literature Review
- Analysis of Strategies
- Outreach
- Develop Action Plan

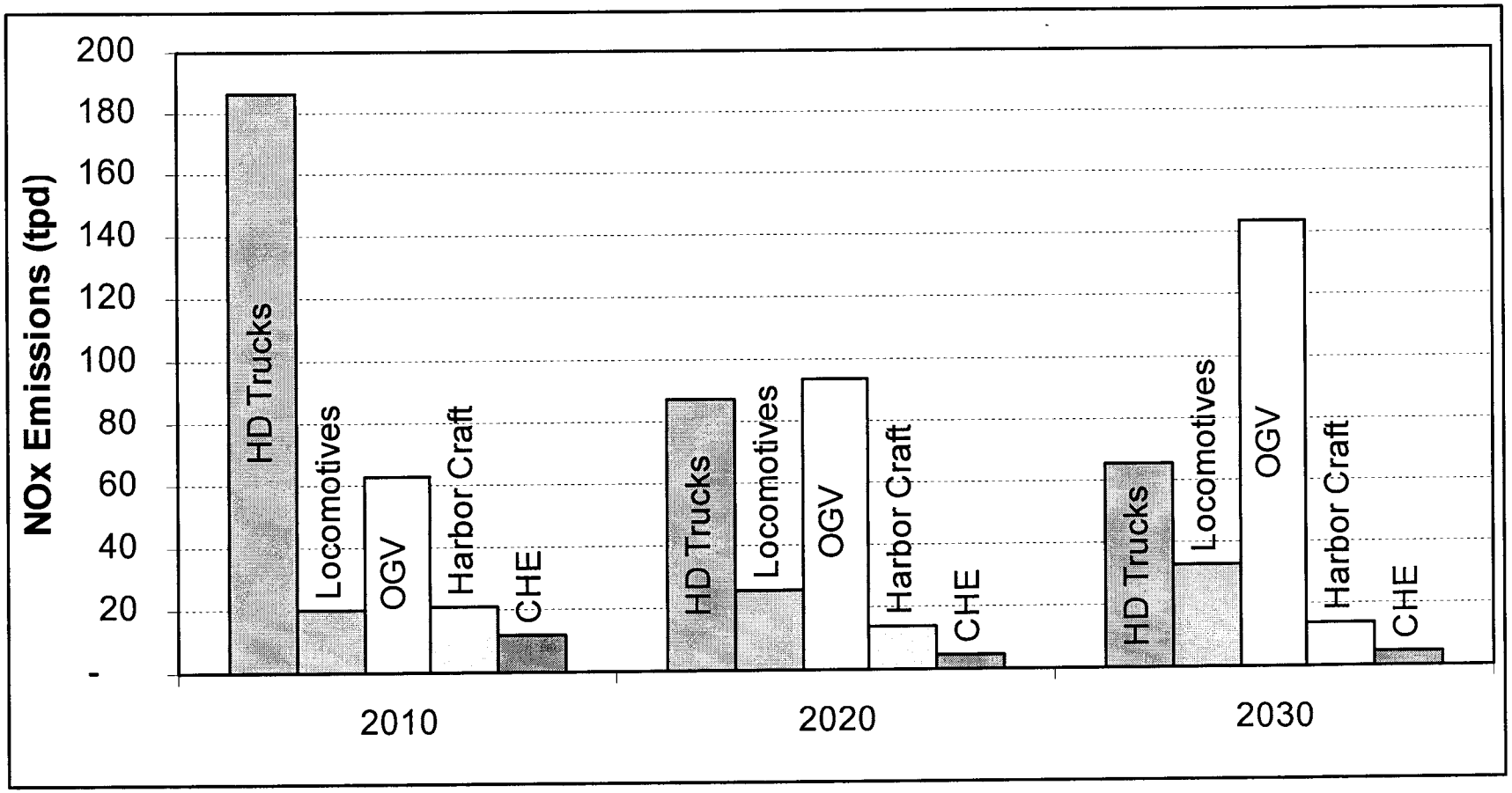
Key Documents

- San Pedro Bay Ports *Clean Air Action Plan*
- Port of Los Angeles *No Net Increase Plan*
- CARB's *Emission Reduction Plan for Ports and Goods Movement*
- SCAQMD's Draft *2007 Air Quality Management Plan*
- Caltrans' *Goods Movement Action Plan*
- SCAG's Goods Movement *Plan for Action*

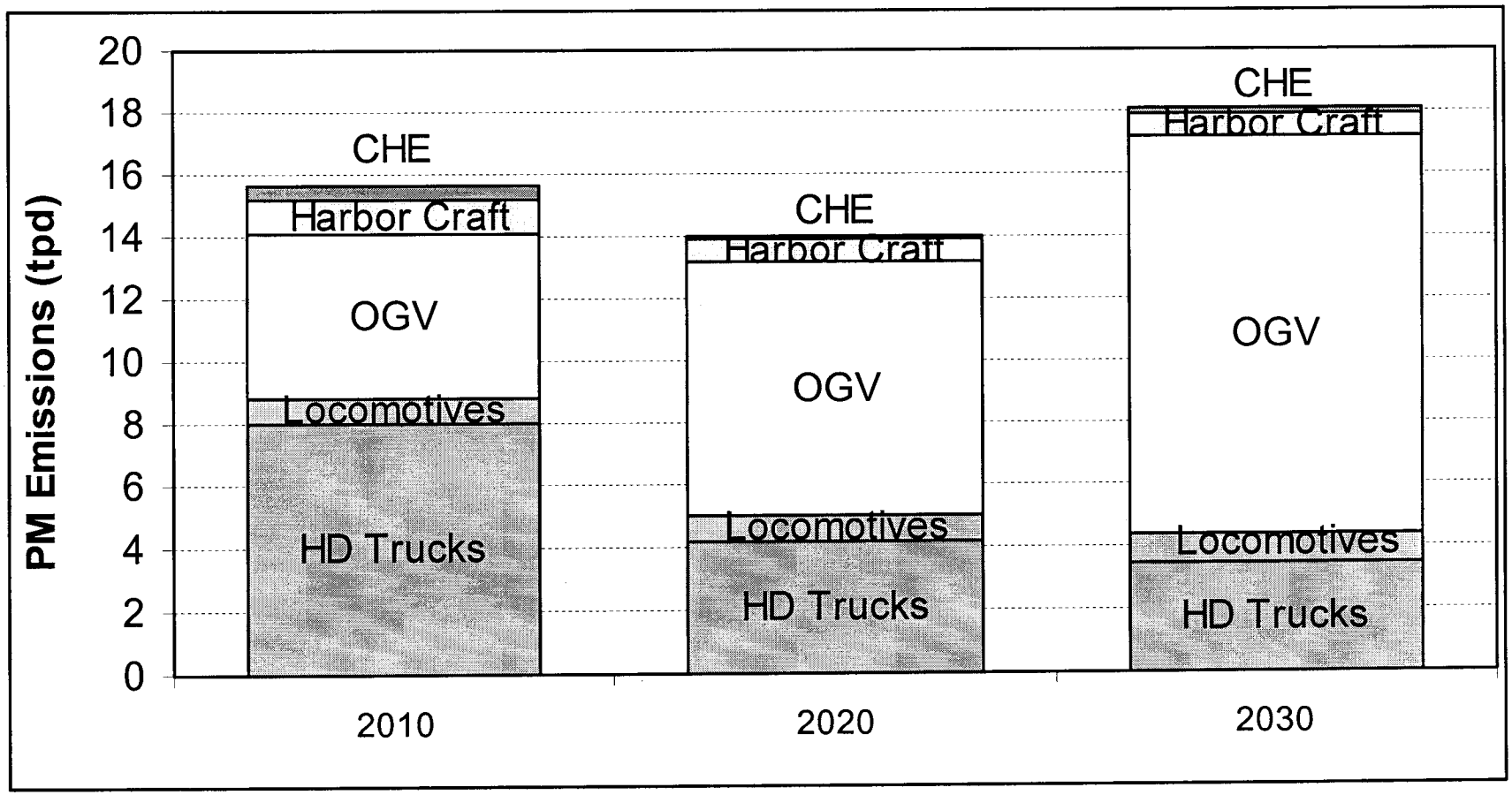
Baseline Goods Movement NOx Emissions (SoCAB)



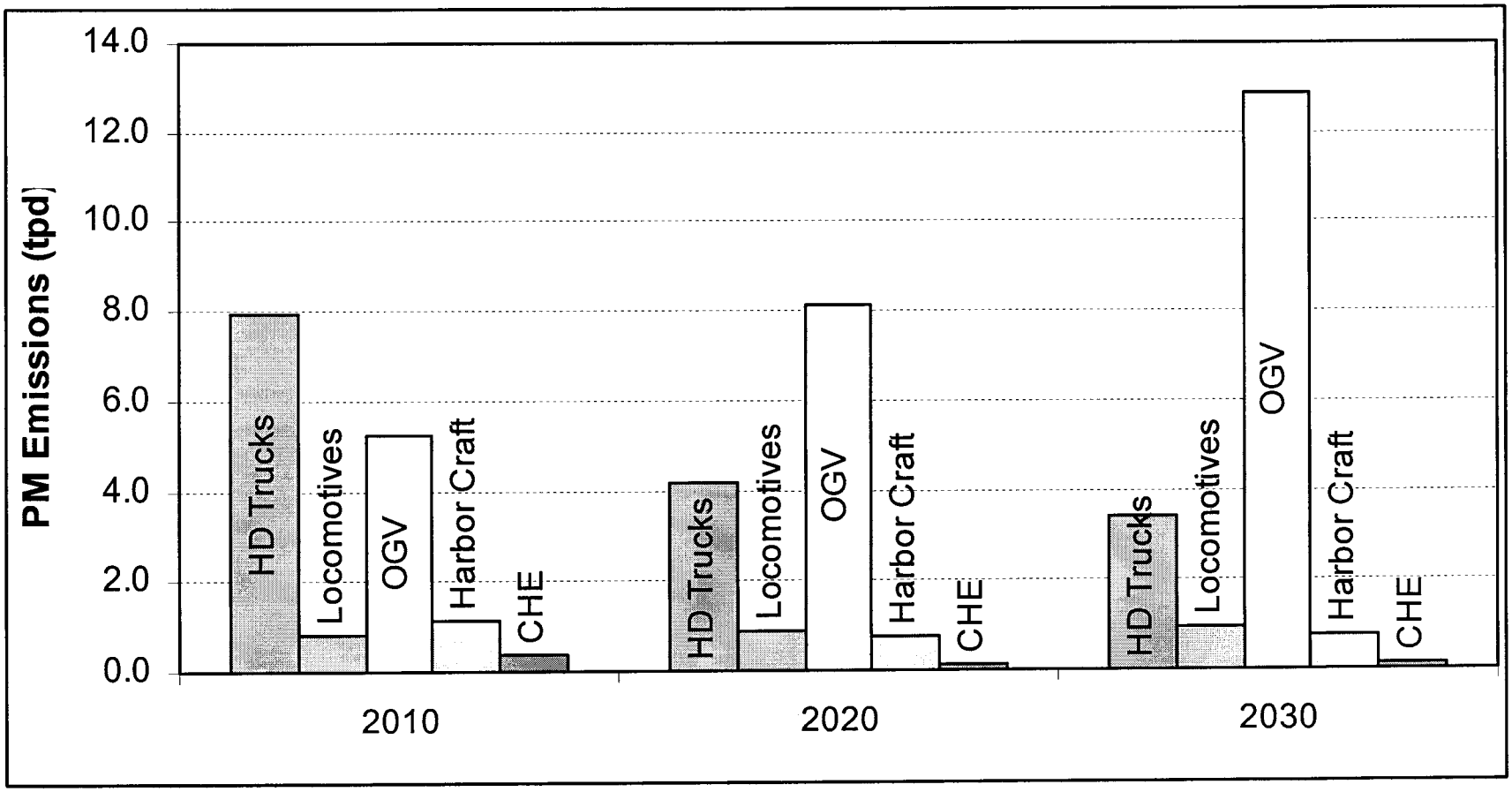
Baseline Goods Movement NOx Emissions (SoCAB)



Baseline Goods Movement PM Emissions (SoCAB)



Baseline Goods Movement PM Emissions (SoCAB)



Types of Emission Reduction Strategies

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Engine, Equipment, Fuel Strategies	Operational Strategies
• New standards	• Speed changes
• Replacement (scrappage)	• Idle reduction
• Repower	• Mode shift
• Retrofit	• Efficiency improvements
• Alt. Fuels	

Types of Emission Reduction Strategies, cont.

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Regulatory / Enforceable Strategies

- State/local rules & regulations
  - Technology-based
  - Performance-based
- Federal or international rules & regulations
- Lease agreements
- Enforceable agreements

Voluntary Strategies

- Incentives
  - Monetary
  - Non-monetary
- Contracting mechanisms
- Education and leadership
- Cost-savings

HD Truck Strategies

- Truck Replacement
- Retrofit with DOC
- Retrofit with FTF
- Retrofit with DPF
- Repowering
- Virtual Container Yard
- Expanded Incident Management for Truck
- Expansion of PierPass
- Dedicated Truckways
- Chassis Pools

Railroad Strategies

- APU Hybrid Locomotive (Green Goat)
- Retrofit with DOC
- Retrofit with DPF
- Retrofit with SCR
- New Emission Standards
- Electrification of Alameda Corridor
- Locomotive Idle Reduction
- Expansion of On-Dock Service
- Expansion of Near-Dock Service
- Inland Rail Improvements
- Grade Crossing Separation

Ocean-Going Vessel Strategies

- OGV Speed Reduction
- Cold Ironing (shore power)
- Expanded Aux Engine Fuel Requirements
- Main Engine Fuel Requirements
- OGV Engine Improvements: Slide Valve Injectors
- OGV Engine Improvements: Other Technologies
- Crane Double Cycling

Harbor Craft Strategies

- Emulsified Fuel
- Biodiesel
- Retrofit with Emission Controls (DOC, DPF, SCR)
- Shore Power for Harbor Craft
- Repowering

Cargo Handling Equipment Strategies

- Engine/Equipment Replacement
- Alternative Fuels (LPG, LNG, Electrification)
- NOx Control Retrofits

Cost Effectiveness Methodology

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- Annualized Cost Effectiveness

$$\frac{\text{Annualized Capital Cost + Annual O\&M Cost (in \$/year)}}{\text{Annual emission reduction (in tons/year of NOx, ROG, or PM)}}$$

- AQMD BACT Method

$$\frac{\text{NPV (all Capital Costs + all O\&M Costs)}}{\text{Total lifetime emission reduction (in tons of NOx, ROG, or PM)}}$$

Cost-Effectiveness Examples – Truck Strategies in 2010

Strategy	NOx	PM
Replace MY 1988-1993 MHDDT with MY 1998-2002	$16,149	$301,137
Replace MY 1994-2002 HHDDT with MY 2007+	$4,904	$96,359
Retrofit MY 1994-2002 HHDDT with DOC	N/A	$17,879
Retrofit MY 1994-2002 HHDDT with FTF	N/A	$20,114
Retrofit MY 1994-2002 HHDDT with DPF	N/A	$13,575
Repower MY 2003-2006 MHDDT with 2007+ engine	$27,299	$1,147,996
Repower MY 2003-2006 HHDDT with 2007+ engine	$7,295	$64,575
Virtual Container Yard (5% re-use)	$6,558	$160,230
Truck Incident Management on I-710	$7,041	$27,212
PierPass Expansion	$30,667	$484,005

(preliminary draft results)

Cost-Effectiveness Examples – Railroad Strategies in 2010

Strategy	NOx	PM
Hybrid Switch Engine (Green Goat)	<0	<0
Retrofit Switcher with DOC	N/A	$64,472
Retrofit Line Haul Engine with DOC	N/A	$38,160
Retrofit Switcher with DPF	N/A	$97,320
Retrofit Line Haul Engine with DPF	N/A	$33,130
Locomotive Idle Reduction	<0	<0
Electrification of Alameda Corridor (low)	$12,680	$254,593
Electrification of Alameda Corridor (high)	$34,771	$698,163
On-Dock Rail Expansion	$49,112	$1,121,869
Near-Dock Rail Expansion	$32,096	$735,867

(preliminary draft results)

Next Steps

- Complete Draft Task 1 Report
- Respond to Reviewer Comments and Complete Final Task 1 Report
- Stakeholder Outreach
- Develop Emission Reduction "Action Plan"